**Five Misconceptions from the Unit: Electrochemistry**

**Misconception # 1**

**Reduction and oxidation reactions can occur in isolation.**

Remind students that the oxidation-reduction process involves the transfer of an electron from a donor (becomes oxidised) to an acceptor (becomes reduced) and this occurs together.

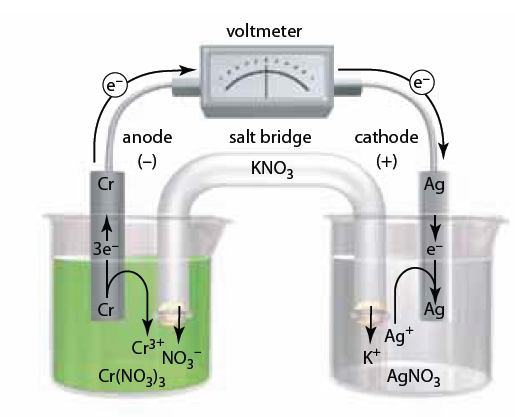
Also, half –reaction equations represents just that: half of a reaction. Thus an ‘oxidation half-reaction’ refers to half of a redox reaction and ‘reduction half-reaction’ refers to the other half of a redox reaction.

To reduce confusion, the text book never refers to reduction as a’ reduction reaction’ or oxidation as an ‘oxidation reaction’, it always refer to a redox reaction. Avoid using misleading terms such as ‘reduction reaction and ‘and ‘oxidation reaction in classes.

**Misconception # 2**

**Free electrons flow through the salt bridge or electrolyte solution to complete the circuit in a cell.**

This misconception can be addressed by using detailed diagrams or multimedia presentation (animation or video clip) showing the movement of ions (anions and cations), not electrons going through salt bridge or electrolyte solution. A visual representation will help students visualise these concepts. Please see the figure below:



**Misconception # 3**

**The anode must appear on the left in a galvanic cell diagram**

Remind students that the convention of “anode on the left” applies only to the cell notation. In a diagram of a galvanic cell, the anode can appear on the left or the right, as it can in a lab setting. To avoid the misconception that a diagram must show the anode on the left, switch the positions of cathode and anode when sketching diagrams of galvanic cells on different occasions.

**Misconception # 4**

**Oxidation numbers represent an ionic charge in a covalent molecule or polyatomic ion.**

Tell students that assigning oxidation numbers to elements in a covalent molecule or polyatomic ion is done, for the purposes of electron tracking, on the basis of pretending that bonds in these species are ionic. To help address this misconception, ensure that ionic charge is always written with the charge following the number(1+) and oxidation numbers are always written with the charge in front of the number (+1).

For example, H in the HCl has an ionic charge of 1+. However, H in H2O has an oxidation number of +1.

**Misconception # 5**

**Cell potential changes when the volume of the solution in the cell changes, or when the reaction equation is reversed or multiplied by a numerical coefficient.**

Students will tend to reverse the sign of half-cell potential when they reverse the equation or to multiply the cell potential when the multiply the equation with a numerical coefficient. This will seem confusing to students who may feel that potential difference should also be multiplied, according to Hess’s Law. It is important to clarify to students that half cell potentials are intensive properties, unlike enthalpy, i.e., potential difference does not depend on the size or amount of matter in the object. Therefore, cell potential is not changed when the volume of solution in cell is changed or when the equation is reversed or multiplied by a numerical coefficient. To avoid any confusion, always use the same standard cell potential formula (Eocell = Eocathode – Eoanode) for calculating the potential differences for both the galvanic and electrolytic cells.